# Chapter 5 BALD EAGLE

## 5.1 Status

The USFWS currently lists the bald eagle (*Haliaeetus leucocephalus*) as threatened in the lower 48 states. The USFWS initially listed the bald eagle as an endangered species in 43 lower states and as a threatened species in the remaining 5 lower states. Bans on DDT and other persistent organochloride pesticides, habitat protection, and a growing public awareness of the bald eagles' plight helped bald eagle populations steadily increase. This increase led the USFWS to reclassify the bald eagle in 1995 from endangered to threatened in all lower 48 states (60 FR 35999).

The bald eagle population continues to grow, and numeric delisting goals for the region have been met since 1995. In July 1999, USFWS published a proposed rule to remove the bald eagle from the list of endangered and threatened wildlife in the lower 48 states (64 FR 36453). Though recovery goals are being met, there has been no further formal action to delist the species.

## 5.2 Distribution

### 5.2.1 Historical Distribution

Historically, the bald eagle used most of the North American continent for breeding, nesting, and foraging (USFWS 1986). The wintering range included most of the breeding range from southern Alaska and Canada to the south (USFWS 1986).

### 5.2.2 Current Distribution

In 1998, bald eagles nested in all but 2 of the lower 48 states (64 FR 36453).

Oregon and Washington have been strongholds for bald eagles with more than two-thirds of the nesting population and one-half of the wintering population of the Pacific Recovery Area (California, Idaho, Montana, Nevada, Oregon, Washington, and Wyoming) (USFWS 1994). Occupied breeding territories surveyed in Oregon increased from 20 in 1971 to 416 in 2003 (Isaacs and Anthony 2003). The number of occupied territories in Idaho increased from 11 in 1979 to 147 in 2003

(Sallabanks 2003b). These numbers are all-time highs for both states. Within the action area in Wyoming, the number of active territories has remained constant at 37 in the last three years because the habitat is likely saturated (Patla 2004).

Wintering bald eagles primarily use open ice-free water near concentrated food sources. Mid-winter bald eagle surveys have tracked wintering populations. Wintering populations are difficult to assess because the weather and concentrations of food on which they depend can vary significantly year to year. However, the Pacific Northwest supports a significant portion of wintering bald eagles in the lower 48 states (USFWS 1986).

## 5.3 Life History

The bald eagle, like most birds of prey, exhibits sexual dimorphism with the females weighing more than the males. Males and females are thought to mate for life, returning to the same nesting territory year after year. Figure 5-1 shows a bald eagle approaching its nest. A clutch of one to three eggs is laid and incubated mostly by the female for about 35 days. The young fledge in 72 to 75 days. Often, the older, stronger bird kills its younger, weaker sibling in the competition for food. Bald eagles require 4 to 5 years to reach sexual maturity and attain full adult plumage. Prior to that time, immature bald eagles are often confused with immature golden eagles.


**Figure 5-1. Nesting bald eagle.**

## 5.4 Habitat Requirements

### 5.4.1 Nesting Habitat

In the Pacific Northwest, bald eagles typically nest in multi-layered coniferous stands with old-growth trees and within 1 mile of large bodies of water (lakes, reservoirs, large rivers, and coastal estuaries). Availability of suitable trees for nesting and perching is critical. Nest trees in the Pacific Northwest are found primarily in ponderosa pine, mixed conifer, Douglas fir, and Sitka spruce/western hemlock forests (USFWS 1986). However, the species of tree used for nesting varies. In Idaho, nests are typically found in large cottonwoods, ponderosa pines, and Douglas firs (USFWS 1986). Wyoming nests have been reported in a variety of forest types, including old-growth ponderosa pine and narrow strips of forest vegetation

surrounded by rangeland. Bald eagles generally avoid building nests in areas with nearby human activity.

The nesting season for bald eagles in the Pacific Northwest generally extends from January 1 to mid-August (USFWS 1994). Young are usually produced in March and fledged in July; however, they may stay near the nest for several weeks after fledging.

### 5.4.2 Wintering Habitat

Bald eagles winter in the Pacific Northwest from approximately November through March and are primarily associated with open, ice-free water near concentrated food sources (such as anadromous fish runs or high concentrations of waterfowl). Important habitat features include perch trees that provide an unobstructed view of the surrounding area near foraging sites (USFWS 1986). Ponderosa pine and cottonwood snags are preferred perches in some areas, probably due to their open structure and height.

Bald eagles may also use communal night roost sites in winter for protection from inclement weather. Characteristics of communal winter roost sites differ considerably from diurnal perch sites (USFWS 1986), although both are invariably near concentrated food sources. Roost sites tend to provide more protection from weather and tend to be located in unevenly-aged forest stands with some old-growth forest structure. Conifers might be a more thermally favorable microenvironment than dead or deciduous trees, which might explain their high use by wintering eagles. In eastern Washington, bald eagles have been observed roosting in mixed stands of Douglas-fir and ponderosa pine and in stands of black locust and black cottonwood.

### 5.4.3 Foraging Habitat

Throughout their range, bald eagles are opportunistic foragers. In the Pacific Northwest, bald eagles consume a range of foods, including a variety of fish, waterfowl, jackrabbits, and mammalian carrion (USFWS 1994). Bald eagles tend to prefer both game and non-game fish species, but this diet depends on prey availability. Winter-killed mammals can be important on big game winter ranges, while waterfowl are important where concentrations are significant. Fish are also taken as carrion, especially spawned-out kokanee (USFWS 1986).

## 5.5 Factors Contributing to Species Decline

The use of DDT and other organochloride pesticides, shooting, poisoning, and habitat degradation have primarily caused the decline in bald eagle numbers. Most of the

factors that prompted the listing of the bald eagle have been eliminated or greatly improved, and this has led to the recovery of bald eagle populations in most of its historical range. The United States banned the use of DDT and related pesticides in the early 1970s, and except for geographically isolated areas, the concentration of its residues and other contaminants in the environment affecting bald eagles has declined significantly (64 FR 36453). Shooting and poisoning of bald eagles have been greatly reduced since the passage of the Bald Eagle Protection Act in 1940 and increases in public awareness. The threat of lead poisoning from eating waterfowl wounded with lead shot has been reduced since the 1991 requirement to use non-toxic shot in waterfowl hunting.

Based on increasing population trends, neither nesting nor wintering habitats appear to be limiting, and there are no indications that availability of these habitats will be limiting in the near future (64 FR 36453).

Human disturbance to bald eagles, especially at nest sites, is a continuing threat and may increase as both bald eagle and human populations expand. Numerous studies have documented that human disturbance will flush most bald eagles from nest sites (64 FR 36453). Repeated disturbances may cause the nest to fail. Electrocution is also an ongoing problem in some areas where power lines have not been modified to prevent raptor electrocution.

## 5.6 Recovery Efforts

After initial ESA listing, the USFWS initiated a recovery program for bald eagles and divided the lower 48 states into five bald eagle recovery regions. Separate recovery teams composed of species experts in each geographic area prepared regional recovery plans. The teams established recovery goals and identified tasks to achieve those goals. The Snake River basin is within the Pacific Recovery Region that includes California, Idaho, Montana, Nevada, Oregon, Washington, and Wyoming. The Pacific Bald Eagle Recovery Plan (PBERP) was approved in 1986 (USFWS 1986).

The PBERP numeric delisting goals have been met since 1995 (64 FR 36453). These delisting requirements include:

- A minimum of 800 nesting pairs.
- An average reproductive rate of 1.0 fledged young per pair, with an average success rate per occupied site of not less than 65 percent.
- Breeding population goals met in at least 80 percent of the management zones.
- Stable or increasing wintering populations.

Productivity in the Pacific Recovery Region has averaged about 1.0 young per occupied breeding area since 1990 (64 FR 36453). The average success rate for occupied breeding areas exceeded 65 percent for the 5-year period ending in 1999. For 1998, six of the region's seven states reported an average success rate of 75 percent. The number of occupied breeding areas exceeded 800 in 1990 and has continued to increase, with an estimated 1,480 occupied breeding territories in 1998.

The bald eagle population in the Pacific Recovery Region is currently five times larger than when the recovery team developed the Pacific Recovery Plan.

The plan goal for distribution among management zones is not yet fully achieved for all areas; however, these zone targets were based on estimates made at the time, and some zones that still lack nesting may not contain preferred habitat (64 FR 36453) As of 1999, 28 of 37 (76 percent) of the management zone targets had been met. Of the 28 zones where target levels have been met, at least 11 have more than doubled the established goal.

## 5.7 Current Conditions in the Action Areas

The bald eagle occurs within the action areas for all 11 proposed actions.

It is difficult to quantify the effects of past operation of Reclamation projects on bald eagles. The decline in bald eagle numbers from organochloride pesticides and other factors prior to the beginning of the species recovery in the 1970s was so overriding throughout the bald eagle's range that effects from O&M of Reclamation's dams and reservoirs were largely difficult to discern. Organochloride pesticide residues and other toxic and persistent chemicals that led to the bald eagle's steep decline across the United States are no longer a problem except in a few geographically isolated areas (64 FR 36453).

In general, the construction and past operation of Reclamation and other Federal and private dams have altered the native riparian habitats in much of the action areas. Dams have altered flood cycles and allowed development to occur in the former floodplain, which may have reduced the number of large cottonwood trees used by eagles as perches in some downstream river reaches.

Conversely, reservoirs typically provide a plentiful source of prey for bald eagles. Indeed, breeding territories tend to be clustered around some reservoirs. Although pre-Reclamation dam information is not available, the storage of water has likely enhanced foraging habitat for nesting bald eagles in areas like Lake Cascade, Anderson Ranch Reservoir, and Arrowrock Reservoir since there are comparatively fewer bald eagle breeding territories in unaltered river reaches above the reservoirs.

The drafting of Reclamation reservoirs for irrigation and other project purposes during the summer does not provide ideal habitat for some fish species. This is particularly pronounced during drought years when Reclamation reservoirs usually experience substantial drawdown. Reduced reservoir volume directly affects the amount of aquatic environment for all organisms in the food web (USBR 2003), and reduction in the food base may limit the availability of fish as bald eagle prey.

In spite of seasonal drawdowns, Reclamation reservoirs do support abundant bald eagle prey in the form of fish and waterfowl. Even though deep drawdowns during drought periods have contributed to fish kills in reservoirs such as Lake Cascade (IDEQ 1996) and Anderson Ranch (Megargle 2004), this does not affect all species, and these reservoirs continue to support viable sport fisheries and relatively high number of productive bald eagle breeding territories. State fish and wildlife agencies also augment the bald eagle food supply with the annual stocking of native and non-native gamefish in and below reservoirs, and this likely has mitigated some of the adverse effects of drawdowns to bald eagle prey. Overall, there appears to be no direct correlation between drought periods and bald eagle occupancy or productivity in the action area.

The deep drafting of reservoirs during drought periods has also been shown to benefit wintering bald eagle foraging in the Boise River. Kaltenecker and Bechard (1995) and Salow and Hostettler (2004) indicated significant bald eagle predation on fish in braided shallow sections of exposed reservoir bottoms during extreme drawdowns.

Though bald eagles are sometimes tolerant of human activity, disturbance has been identified as a potential problem, particularly for breeding bald eagles (64 FR 36453). Disturbing eagles near their nests early in the breeding season can adversely affect bald eagle productivity. As bald eagle and human populations increased, so have human/eagle interactions. Interactions between eagles and recreationists are a potential problem at some Reclamation reservoirs, especially in areas where the adjacent private land has been developed.

Reclamation has prepared resource management plans (RMPs) for Reclamation-administered lands surrounding American Falls, Ririe, Cascade, and Black Canyon Reservoirs (USBR 1995a, 2001b, 2002, 2004). These RMPs address only land management and water-related recreation use and do not address operation of the reservoirs. For each of these planning processes, Reclamation consulted with USFWS under Section 7 of the ESA. All of the Reclamation RMPs prescribe management actions that preserve or enhance bald eagle habitat where applicable, with special protection for bald eagle nests. In addition to protective measures in the RMPs, Reclamation cooperated with other agencies to prepare site specific breeding territory management plans for nests at Arrowrock Reservoir and Lake Cascade (USFS et al. 1990; Perkins and Kaltenecker 2003, 2004; Kimball and Bechard 2002).

In the Snake River above Milner Dam, Reclamation is not a cooperator in any existing management plan. The nest on Ririe Reservoir is the only nest on Reclamation-managed land in this area, and there is not enough information available for this nest area to develop a specific plan. The Ririe RMP discusses this nest and describes a process for protection if recreation impacts occur (USBR 2001b). The nest is currently being monitored under a contract with the Fort Hall Business Council of the Shoshone-Bannock Tribes.

The USFS, also subject to Section 7 consultations for their resource management planning documents, manages much of the land surrounding the reservoirs in the action areas. Some site-specific territory management plans have been prepared. These documents provide guidance for protection of bald eagle breeding and important foraging areas.

The annual reports of Beals and Melquist (1995, 1996, 1997, 1998, 1999, 2000) and Sallabanks (2002, 2003a, 2003b) document bald eagle breeding success in Idaho. Isaacs and Anthony (2003) document breeding success in Oregon. Patla (2004) compiled productivity reports for the years 2001 through 2003 to describe breeding success in Wyoming. The following subsections incorporate data from these references without further citations.

### 5.7.1 Snake River above Milner Dam

The Snake River above Milner Dam supports the largest breeding population of bald eagles in the State of Idaho and a significant population of wintering bald eagles. The breeding population in this area has increased steadily since 1970 (GYBEWG 1996). In 1979, there were an estimated 11 occupied nest sites in Idaho. In 1996, there were 46 known occupied breeding territories in eastern Idaho alone and 90 sites statewide. Currently there are 57 territories that are routinely active in the Snake River basin above Idaho Falls, Idaho, and another 37 in Wyoming (there are additional nests in Wyoming within Management Zone 18 that are not part of the Snake River basin) (Whitfield et al. 2003). Table 5-1 presents occupation and production data for bald eagle territories in the Snake River basin above Idaho Falls, Idaho.

**Table 5-1. Bald eagle territories in the Idaho and Wyoming portions of Management Zone 18, Greater Yellowstone Ecosystem, in 2003.**

| Management Zone 18 | Idaho | Wyoming |
|---|---|---|
| Number of territories | 57 | 43 |
| Number occupied | 56 | 42 |
| Percent occupied | 0.98 | 0.98 |
| Number of young produced | 56 | 39 |
| Number of young/occupied territory | 1.00 | 0.93 |

On the Idaho portion of the Snake River above Milner Dam, a series of 13 routes have been surveyed on an annual basis during the National Mid-Winter Bald Eagle Count (Steenhoff 1997). While wintering populations of bald eagles in Idaho have been monitored regularly since 1980, the information gained from this survey has limitations in its use. The total number of eagles for these 13 routes collectively has ranged from a low of 49 to a high of 241. Many variables, including weather conditions and inconsistency of route surveyors, make the interpretation of the data difficult. It is not possible at present to identify a clear trend for wintering bald eagle use of the Snake River in Idaho.

Anecdotal data presented in the 2002 Annual Productivity Report for the Greater Yellowstone Ecosystem (Whitfield 2002) indicated that wet, cool spring and low reservoir levels appear to have reduced overall productivity for 1993 until 2002 for Palisades and Island Park Reservoirs. This is the only mention of low reservoir levels affecting productivity in the annual reports reviewed. Sallabanks (2003b) reports that only the Hoffman nest on Palisades Reservoir was not occupied and that 5 of the 8 nests associated with Palisades and Island Park Reservoirs were successful even though the reservoirs were drawn down to their lowest elevations in several years. There are no definitive trend data available that show that reservoir drawdown has adversely affected breeding bald eagles in this area.

**Snake River in Wyoming**

Bald eagle populations have increased along the Snake River in Wyoming. Nesting surveys conducted between 1978 and 2003 by Wyoming Game and Fish Department (WGFD) and others show that breeding territories have greatly increased from an estimated 9 in 1978 to 36 regularly active nest areas along the Snake River, including 3 on Jackson Lake, 2 on the Salt River, and 1 on the Hoback River in 2003 (Harmata and Oakleaf 1992). Reclamation has no facilities on the Salt River, and Reclamation's operations do not hydrologically influence the Salt River.

It appears that fluctuating Jackson Lake reservoir elevations have had a benign effect on bald eagle use. Nothing in the literature indicates the 10-foot operational fluctuations affect the reservoir's three breeding territories, and in fact, during the 1985-to-1989 dam reconstruction drawdown of 35 feet, a bald eagle established a new and productive territory along Third Creek within a quarter mile of the reservoir's high water mark and one mile from the dam and construction area.

As indicated earlier, there is a possibility that the available nesting habitat may be saturated. Harmata and Oakleaf (1992) anticipated that increased human populations and recreational use will reduce bald eagle nesting habitat in the near future.

Because Jackson Lake ices over during winter, it is not known as a bald eagle wintering area. In the Snake River downstream from Jackson Dam, most of the breeding pairs are year-long residents and depend on the Snake River fish and waterfowl population as a main source of food. During the bald eagle nesting season, river levels have been adequate to maintain sufficient habitat for fish and waterfowl prey. The riverine environment and surrounding prey habitat provide an abundant prey base for nesting eagles. Past project operations have not precluded the increasing bald eagle nesting populations in this area.

An agreement with the State of Wyoming allows for reservoir releases that benefit the downstream fishery during winter months when conditions are the most critical. During low winter flows, this agreement provides for the release of flows necessary to maintain the fishery. Additionally, Reclamation has an informal agreement with Wyoming to maintain winter flows from the dam at less than 600 cfs to prevent the formation of frazzle ice, which can adversely affect the fishery.

**Snake River from the Wyoming State Line to the Henrys Fork Confluence**

The mainstem Snake River, with its extensive cottonwood forest, provides excellent wintering and breeding habitat. The number of eagles using the area for both wintering and breeding has steadily increased over the last 20 years.

Based on mid-winter counts, use of the mainstem has ranged from as few as a dozen eagles to as many as 70. As the population of eagles in the Greater Yellowstone Ecosystem has increased, winter use on the mainstem has also steadily increased. The cottonwood forest along the river provides virtually unlimited hunting perches and roosting opportunities immediately adjacent to the river, and the excellent fishery provides an abundant source of food. Of the mainstem nests, one was not occupied, three were unsuccessful, and the rest were successful.

Current monitoring activities include a total of 23 breeding territories along the mainstem river and Ririe Reservoir. Table 5-2 on page 120 shows several nests in the action area; it also shows that there is no discernable difference in bald eagle occupancy and success of nests associated with Palisades, Island Park, or Henrys Lake.

In the mainstem Snake River below Palisades Dam, low winter flows have been theorized to benefit native cutthroat trout; however, when flows drop below 1,200 cfs (as occurs during low water years) and temperatures are low, the shallow water in the side channels can ice over. Fish in these channels then become unavailable to foraging eagles. This is considered a minor loss as there remains a large fishery forage base in the main channel as well as forage sources in adjacent areas such as big game carrion.

**Table 5-2. Bald eagle breeding territory occupancy and production in the Snake River system above Milner Dam within the State of Idaho from 1996 to 2003.**

| Nesting Territory | Nest Production [1] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
| **Palisades Reservoir** | | | | | | | | |
| Hoffman East | Y2 | Y1 | Y0 | Y0 | Y0 | N | Y2 | Y0 |
| Hoffman West/Trout Creek | | Y2 | N | N | N | N | N | Y2 |
| Williams Creek | Y2 | N | Y0 | Y2 | Y2 | Y2 | Y0 | Y1 |
| Van Point North | Y0 | Y1 | Y1 | Y1 | Y2 | Y2 | Y1 | Y1 |
| Van Point South | | Y1 | N | Y2 | Y2 | N | Y0 | Y0 |
| Edwards Creek | | N | Y0 | Y0 | N | N | Y0 | Y0 |
| King Creek | | N | Y0 | Y2 | Y2 | Y1 | Y0 | Y0 |
| **Island Park Reservoir** | | | | | | | | |
| Bishop Lake | Y1 | Y3 | Y0 | Y0 | Y0 | Y1 | Y0 | Y0 |
| I.P. Bills Island | Y1 | Y0 | Y0 | Y0 | Y1 | Y1 | Y0 | Y2 |
| **Henrys Lake** | | | | | | | | |
| Henrys Lake | N | Y0 | Y1 | Y1 | Y2 | Y1 | Y1 | Y1 |
| Staley Springs | Y1 | Y2 | Y1 | Y0 | Y0 | Y0 | Y0 | Y0 |
| **Summary Totals** | | | | | | | | |
| Young Produced | 7 | 10 | 3 | 8 | 11 | 8 | 4 | 7 |
| Occupied Territories | 6 | 8 | 9 | 10 | 9 | 7 | 10 | 11 |
| Successful Territories | 5 | 6 | 3 | 5 | 6 | 6 | 3 | 5 |
| Young / Occupied Territory | 1.2 | 1.3 | 0.3 | 0.8 | 1.2 | 1.1 | 0.4 | 0.6 |
| Young / Successful Territory | 1.4 | 1.6 | 1.0 | 1.6 | 1.8 | 1.3 | 1.3 | 1.4 |

1 N is 'not occupied;' Y0 is 'occupied but no young fledged;' Y1 is 'one young fledged.'

High spring flows that inundate waterfowl nesting habitat probably do not measurably affect the presence or overall production of waterfowl. Waterfowl appear to be abundant along this reach throughout the year in most years and appear to be numerous enough to be a substantial portion of nesting bald eagles' diet.

Flood control operations from Palisades Reservoir operations may have reduced the availability of large black cottonwood trees bald eagles use for perching and nesting. Mature trees are currently available, but the reduction of seasonal flooding and building of new alluvial seed beds may be reducing germination of new trees. Following the 1997 flood, this does not appear to be nearly as significant. Additionally, within the proposed action, Reclamation will provide spring freshets that mimic natural flow conditions when possible (depending on water year type and carryover). The benefit of this strategy is currently being researched.

**Henrys Fork and Tributaries**

With its many rivers, streams, and lakes, the Henrys Fork drainage is well suited as bald eagle breeding habitat. Major aquatic resources include the Henrys Fork, Buffalo River, Henrys Lake, and Ashton, Island Park, and Sheridan Reservoirs. Excellent fishery and waterfowl habitat provide abundant foraging opportunities for reproducing eagles. Similar to the description for Jackson Lake reservoir drawdowns, nests at Island Park Reservoir and Henrys Lake were successful in 2003 even though the reservoirs were drawn down to low levels.

Nesting bald eagles extensively use the Henrys Fork drainage. The 24 known breeding territories in 1996 increased to 29 territories in 2003. Of these, 28 were occupied, 12 were successful, and 20 young were produced.

Records for wintering bald eagles in the Henrys Fork drainage are incomplete, which makes the available statistical analysis somewhat suspect. However, from the records that do exist, an average of 20 eagles can be found wintering along the Henrys Fork. Regulated winter flow releases from Island Park Reservoir have caused flows to drop below 200 cfs in about 33 percent of the years on record. At flows this low, juvenile fish can become dewatered, and over-winter survival of young-of-the-year rainbow trout is reduced in Box Canyon. This is likely an insignificant effect on the availability of forage fish in winter along the approximately 70-mile extent of the Henrys Fork.

There are no known records of nesting bald eagles at Grassy Lake. However, it is expected that migrating or dispersing eagles likely forage at this reservoir.

**Snake River and Tributaries from the Henrys Fork to Milner Dam**

This reach of the mainstem Snake River supports a large number of wintering bald eagles. Since 1980, mid-winter counts have documented as many as 100 eagles in this reach with an average of about 60 eagles. Above American Falls Reservoir, the mature cottonwood forests provide an abundance of day and night roosting opportunities adjacent to foraging areas on the Snake River. The river provides substantial fish and waterfowl populations as a source of food. Cottonwood habitat is limited below American Falls Dam.

The nest at Ririe Reservoir was not active in 2003, but an immature eagle was observed in Willow Creek. This suggests that there may be a second nest in the Ririe Reservoir vicinity (Whitfield et al. 2003). Reservoir drawdown at Ririe Reservoir does not appear to be a significant factor in this nest productivity. A large fishery and a protected wildlife management area remain in close proximity, and a low reservoir level provides additional space between the nest site and on-water recreation activities.

Winter project operations have little effect on bald eagles. Winter mortality of big game from an adjacent winter range provides carrion as an additional food source for nesting bald eagles early in the spring.

Ten recently active breeding territories have been identified upstream from Milner Dam, and they produced 15 young in 2003. These include a new breeding territory on Bird Island in Lake Walcott and a new nest in the Ferry Butte territory.

### 5.7.2 Snake River from Milner Dam to Brownlee Reservoir

The PBERP identifies one target breeding territory for this reach of the Snake River (the PBERP does not give specific locations for nests). This reach contains two historical bald eagle territories: one near Milner Dam and the other near Blue Lakes Country Club near Twin Falls. However, monitoring of these sites ended in 2002 after ten consecutive years of not being occupied.

This reach of the Snake River receives significant winter use. Complete counts conducted for a recent 10-year period record between 25 and 56 eagles on the river upstream from Brownlee Reservoir (Steenhoff 1997). Most of the wintering eagles are in the reach from Milner Dam to Grandview.

### 5.7.3 Snake River from Brownlee Reservoir to the Columbia River and the Columbia River to its Mouth

The PBERP identifies one target breeding territory for Brownlee Reservoir on the Idaho side. A new nest was discovered in 2003 on Birch Creek, a Brownlee Reservoir tributary near Farewell Bend, Oregon. There are three breeding territories in the Hells Canyon reach of the Snake River below Brownlee Dam: two on the Idaho side of the river below Oxbow Dam and one on the Oregon side above Oxbow Dam. All three are relatively new (the Idaho territories were discovered in 1998 and 2003 and the Oregon territory was discovered in 1999). All three nests have been very productive, fledging at least one young every year since their discovery. There are no known breeding territories on the Snake River below Hells Canyon Dam (Stinson et al. 2001; Davidson et al. 2004).

Bald eagles winter in substantial numbers in this reach of the Snake River and associated reservoirs with higher numbers in the Hells Canyon reach than in downstream areas (Isaacs et al. 1992; Stinson et al. 2001; Davidson et al. 2004). Eagles tend to concentrate around the reservoirs where reliable food sources such as fish, waterfowl, mammalian carrion, and ground squirrels are present, rather than the unimpounded river reaches (Holthuijzen 2003). Trees and cliffs used for perching are plentiful in the Hells Canyon reach, and 46 night roosts have been located

(Holthuijzen 2003). In the lower reaches, the vegetation is primarily shrub steppe, with few perches and potentially insufficient food supply (Davidson et al. 2004).

Clark and Maret (1998) identified potential problems for fish-eating wildlife and a potential human health risk from elevated concentrations of DDT and its metabolites and mercury in fish at Brownlee Reservoir. Dombrowsky et al. (2000) reviewed the data from Clark and Maret's study and conducted a screening analysis to evaluate the potential for adverse effects to fish-eating wildlife at Brownlee Reservoir. Their analysis indicated that even using conservative assumptions, the potential effects to fish-eating wildlife associated with the presence of the selected chemicals in fish tissue is low to non-existent with the exception of DDT/DDE. A more detailed analysis of the bioavailability of DDT/DDE is needed to assess the true potential for adverse ecological effects.

As noted in other areas, the number of wintering bald eagles varies considerably from year to year. From 1988 to 2000, the Idaho mid-winter bald eagle survey from Brownlee Dam to Hells Canyon Dam ranged from 11 eagles in 1992 to 104 eagles in 1996 (National Biological Information Infrastructure 2004). Holthuijzen (2003) conducted winter surveys on the Snake River from Weiser, Idaho, to the Salmon River confluence from 1993 to 1998 and found a high of 152 eagles in 1994 and a low of 68 eagles in 1998. Most of the eagles were observed in the reservoir pools and within a few miles below Hells Canyon Dam.

Bald eagles both nest and winter along the Columbia River. In 2003 there were 96 occupied breeding territories reported for the Columbia River Recovery Zone (Zone 10), an increase of 31 territories since 1999. Nearly all of the breeding territories and most wintering birds are found in lower reaches of the river below The Dalles (Stinson et al. 2001).

Bald eagle use of the lower Snake and Columbia Rivers is likely related to prey availability (resident fish and waterfowl) and other habitat factors such as the availability of perches and winter roost trees. The presence of breeding bald eagles and significant numbers of wintering eagles in the Hells Canyon reservoirs are due to an abundance of warmwater fish species as well as some salmonids and nongame species (Richter and Chandler 2001). Fish habitat in this reach is most influenced by Idaho Power's operation of its three dams. Reclamation's operations, including providing flow augmentation water, has not affected the reservoir levels in Brownlee Reservoir (the only reservoir in the Hells Canyon Complex with significant storage) since the shaping agreement at Brownlee Reservoir with Idaho Power was not renewed in 2001. Flow augmentation water is passed through the Hells Canyon Complex, and fluctuations in Brownlee Reservoir elevation are due mostly to flood control operations, fall Chinook flows, and power demands (Idaho Power 2003).

Reclamation's operations have not likely influenced flows and habitat for resident fish and waterfowl below Hells Canyon Dam. Flow augmentation provides an increase in late summer, but this is probably inconsequential for bald eagles that winter along the Snake River below Hells Canyon. It is reasonable to expect that any measurable effect to fish habitat would be most pronounced in the areas immediately below Hells Canyon and diminish with distance downstream. It is therefore unlikely that Reclamation's current operations above Brownlee Reservoir affect breeding and wintering bald eagles or their prey base in the lowest reaches of the Snake and Columbia Rivers.

### 5.7.4 Little Wood River Reservoir

The IDFG Conservation Data Center has no records of bald eagle winter or breeding use of the reservoir. There is an unoccupied historical nest located about 20 miles southwest on Silver Creek; this nest has not been active for quite some time and is no longer monitored. The only known breeding territory within Zone 17 of Idaho's portion of the PBERP is about 12 to 15 miles south at Carey Lake. Two young were produced from the 2003 nesting attempt.

### 5.7.5 Boise River System

The Boise River system experiences significant bald eagle use. Table 5-3 presents basin-wide yearly totals for young and territories. The subsections below provide bald eagle use in the river reaches and reservoirs with greater detail.

**Upper Boise River and Anderson Ranch, Arrowrock, and Lucky Peak Reservoirs**

Table 5-3 shows bald eagle territories, occupancy, and breeding success for Arrowrock and Anderson Ranch Reservoirs since 1995. Productivity has fluctuated with young per occupied nest ranging from 0 in 1999 to 1.5 in 2001. Fluctuations in productivity can be attributed to a variety of environmental factors. There appears to be no correlation with yearly variations in operation in the past (dry/wet years) that would indicate prey availability is significantly affected and is limiting bald eagle productivity.

Arrowrock Reservoir currently supports three breeding territories (including the two new territories occupied in 2000 and 2002). Two breeding territories are located on Anderson Ranch Reservoir and another is located just upstream near Featherville (Kaltenecker and Bechard 1995). The Boise River/Anderson Ranch area had one existing breeding territory when the PBERP was developed; the plan identifies two additional target recovery breeding territories for this area.

**Table 5-3. Bald eagle breeding territory occupancy and production in the Boise and Payette River systems from 1995 to 2003.**

| Nesting Territory | Nest Production [1] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
| **Arrowrock Reservoir** | | | | | | | | | |
| Arrowrock | Y0 | Y1 | Y2 | Y1 | N | Y1 | N | Y2 | Y1 |
| Grouse Creek | | | | | | Y3 | Y2 | N [2] | N [2] |
| Upper South Fork Arrowrock | | | | | | | | Y0 | Y0 |
| **Anderson Ranch Reservoir** | | | | | | | | | |
| Powerline | Y1 | Y? | Y1 | Y2 | N | Y2 | Y2 | ? | Y1 |
| Featherville | Y2 | Y1 | Y? | Y1 | Y0 | Y1 | Y2 | Y1 | Y0 |
| Camas Arm (1 and 2) | | | | Y1 | Y0 | Y0 | Y0 | N | Y1 |
| **Lake Lowell** | | | | | | | | | |
| Lake Lowell 1 | Y0 | Y2 | Y0 | N | Y1 | Y1 | Y1 | Y0 | Y0 |
| Lake Lowell 2 | | | | | | | Y2 | Y0 | Y0 |
| **North Fork Payette River below Payette Lake** | | | | | | | | | |
| McCall Airport | | Y2 | Y2 | Y0 | N | Y1 | Y0 | Y1 | Y1 |
| Hait Ranch | Y0 | Y1 | Y2 | Y2 | Y2 | Y2 | Y2 | Y2 | Y0 |
| **Lake Cascade** | | | | | | | | | |
| Donnelly | Y1 | Y0 | Y1 | Y1 | Y2 | Y1 | Y2 | Y1 | Y1 |
| French Creek | Y1 | Y1 | Y3 | Y3 | Y2 | Y1 | Y2 | Y1 | Y2 |
| Poison Creek | Y2 | Y1 | Y1 | Y1 | Y2 | Y0 | Y0 | N [3] | Y0 |
| Hurd Creek | N | Y1 | Y1 | Y1 | Y0 | Y0 | Y0 | N | N |
| Buttercup | Y2 | Y2 | N | Y2 | N | Y2 | Y2 | Y2 | Y2 |
| Gold Fork | N | N | N | N | Y2 | Y2 | Y0 | Y1 | Y2 |
| Sugarloaf | Y0 | Y2 | Y1 | Y0 | Y0 | Y2 | Y0 | Y1 | Y1 |
| Raspberry | | | | Y2 | Y0 | Y2 | Y2 | Y2 | Y2 |
| Island/Hot Spring Park | | | | | | | Y0 | Y3 | Y0 |
| **North Fork Payette River below Lake Cascade** | | | | | | | | | |
| Cabarton | N | Y0 | Y2 | Y2 | Y4 | Y3 | Y0 | Y0 | Y1 |
| Boulder Creek | | | | | | Y2 | Y1 | Y1 | Y2 |
| Smith's Ferry | | | | | | Y0 | Y0 | Y0 | Y0 |
| **Deadwood Reservoir** | | | | | | | | | |
| Deadwood Reservoir | | Y2 | Y2 | Y1 | Y2 | Y1 | Y2 | Y1 | N |
| **Summary Totals** | | | | | | | | | |
| Young Produced | 9 | 16 | 18 | 20 | 17 | 27 | 22 | 19 | 17 |
| Occupied Territories | 10 | 14 | 13 | 15 | 13 | 20 | 21 | 18 | 20 |
| Successful Territories | 6 | 11 | 11 | 13 | 8 | 15 | 12 | 13 | 12 |
| Young / Occupied Territory | 0.90 | 1.14 | 1.38 | 1.33 | 1.31 | 1.35 | 1.05 | 1.06 | 0.85 |
| Young / Successful Territory | 1.50 | 1.45 | 1.64 | 1.54 | 2.13 | 1.80 | 1.83 | 1.46 | 1.42 |

1 N is 'not occupied;' Y0 is 'occupied but no young fledged;' Y1 is 'one young fledged.'

2 Tree blew down in 2001 after breeding.

3 Nest tree blew down in 2001.

Reclamation and USFS have jointly prepared management plans for the Arrowrock territory (Perkins and Kaltenecker 2003) and Upper South Fork of Arrowrock territory (Perkins and Kaltenecker 2004).

The upper Boise River, including the Middle and South Forks and Anderson Ranch, Arrowrock, and Lucky Peak Reservoirs, is considered an important wintering area for bald eagles. In their 2-year study of wintering bald eagles in the upper Boise River, Kaltenecker and Bechard (1995) found fairly heavy use at Anderson Ranch Reservoir (up to 50 eagles documented) and the South Fork Boise River below Anderson Ranch Dam (2 to 25 eagles). Arrowrock and Lucky Peak Reservoir areas also receive significant bald eagle use (up to 15 eagles). Eagles begin arriving in late October with peak numbers in late January or early February. Wintering bald eagles are usually gone by the end of March.

Wintering bald eagles in this area primarily eat fish early in the winter and big game carrion as winter progresses. River and reservoir icing in most years likely prompts this shift as fish become more difficult to capture and as deer and elk carcasses increase later in the winter (Kaltenecker and Bechard 1995). The bald eagles also take waterfowl as prey.

**Lower Boise River**

The Boise River downstream from Lucky Peak Dam is an important winter habitat for bald eagles with as many as 35 individuals counted in a single year (USFWS 1996; Riggins and Hansen 1992). Several studies of wintering bald eagles downstream from Lucky Peak Reservoir have been conducted, with most of the effort concentrated on the reach between Lucky Peak Dam and the city of Boise. Studies have shown that bald eagles usually arrive in early November, have the highest concentrations in January and February, and leave by late March. Very little is known about bald eagle use from Eagle Island to the mouth of the Boise River.

Large cottonwoods throughout the reach are important for eagle perching and visual buffers from human activity (USFWS 1996). Wintering eagles tend to perch throughout the area; they prefer wide areas of the river and pools in well-vegetated areas with high numbers of perches, and they seem to avoid areas of high human use. The Barber Pool area, immediately upstream from the city of Boise, appears to have special importance as a communal night roost.

Bald eagles wintering along the lower Boise River eat fish, waterfowl and other birds, and mammals. Hatchery rainbow trout appear to be important, but other fish species are also taken. Water temperature, nutrient, dissolved oxygen, and sediment problems in the lower Boise River, downstream from Star to the mouth, stem from various land use activities occurring in the watershed. This section of the lower Boise

River is generally unsuitable for coldwater fish species in many years. Wintering eagles likely turn to warmwater fish and waterfowl for forage.

**Lake Lowell**

Lake Lowell, located within the Deer Flat National Wildlife Refuge, is an important area for bald eagles. The lake has abundant prey (fish and waterfowl), suitable nesting and perching trees, and is relatively free of human disturbance for much of the year. Bald eagles nest and winter at Lake Lowell. Table 5-3 on page 125 shows the history for two breeding territories. These territories were not successful in 2002, 2003, and 2004 for unknown reasons (Fenzel 2004).

Reclamation operations at Lake Lowell during dry years have affected the gamefish population. During these dry years, the lake does not fill, and the woody hiding cover around the lake needed by small fish is not inundated. Also, the early spring drawdown in these dry years exposes fish eggs. These problems were particularly severe during the drought of the late 1980s and early 1990s when dam safety reasons prompted lower operational levels for the lake.

Deteriorating water quality from agricultural return flows and other causes may also limit some kinds of fish in the lake. This can impair the lake's warmwater gamefish populations, but other nongame species such as carp persist in high numbers. Taylor and Bechard (1991) observed resident adult and newly fledged eagles in August feeding mostly on carp and waterfowl and using a mudflat area near the nest site.

As in other areas of the valley, wintering bald eagles begin arriving at Lake Lowell in late October; numbers have been as high as 10 to 20 birds over the last 10 years (Ryan 1997). The number of birds using Lake Lowell in the winter largely depends on ice conditions. Prior to ice formation, wintering bald eagles have been observed perching in large open cottonwoods, on mudflats, and on the shoreline. Taylor and Bechard (1991) found that after ice forms over most of the lake, eagle numbers decrease, and the eagles concentrate near the open water near the New York Canal inlet. Wintering eagles primarily prey on waterfowl with the remainder of their prey coming from fish.

Water quality problems at Lake Lowell have been noted for many years. Lake Lowell is on the 1998 Idaho 303d list of water quality impaired water bodies for dissolved oxygen and nutrients. Water quality deterioration is related to nutrient loading and water exchange rates (USBR 2001a). The lake is highly eutrophic and susceptible to both algae blooms in the summer and fall and low dissolved oxygen in the deeper water layers. Bacteria contamination is also a problem at times. Sources of nutrients into the lake include agricultural drainage, urban runoff, domestic wastewater, and natural causes (USBR 2001a).

In 1998, Reclamation and the USFWS cooperated on a study to analyze and evaluate alternatives to improve water quality at Lake Lowell (Burch and King 2000). Water, sediment, and fish tissue were analyzed in this study for a variety of organic and inorganic contaminants. The study detected DDT and its metabolites, heptachlor, and dieldrin in sediments. Total DDT was detected at several sites in concentrations that fall into the "level of concern" category, which could potentially cause contamination in fish, and thus, piscivorous birds.

Mercury concentrations above the chronic freshwater criteria were found in some sampling sites within the lake water during one of two sampling periods. It was theorized that mercury present in the water column during the first sampling may have been due to an algae bloom ongoing at that time. Mercury was not detected in the water of any of the drains and canals that flow into the lake nor was it detected in the lake sediments.

Mercury was also detected in all six species of fish analyzed. Although the concentrations of mercury were below the levels that would cause adverse effects to fish, because mercury bioconcentrates and biomagnifies, these concentrations could be harmful to piscivorous predators such as bald eagles.

The harmful effects to piscivorous birds such as the bald eagle from DDT and mercury are generally related to low reproductive success (USBR 1998). As noted in Table 5-2 on page 120and information provided by Fenzel (2004), bald eagles have occupied their breeding territories but have been unsuccessful the last four years, and this fact does arouse suspicion. However, mercury and DDT have likely been present in fish and lake sediments for a long time, and the nests have been successful previously. There has been no evidence in the nest failures that would point to contaminant problems in breeding eagles (Fenzel 2004). Whether mercury and DDT are affecting bald eagle breeding at Lake Lowell is unknown.

Wintering bald eagles are less susceptible to contaminant problems since they only spend a portion of the year foraging at Lake Lowell, and their diet consists primarily of waterfowl rather than fish (Taylor and Bechard 1991). Most waterfowl are not year-round residents at Lake Lowell and are less likely to contain DDT and mercury in levels of concern, assuming they reside in uncontaminated areas the remainder of the year.

### 5.7.6 Payette River System

The Payette River system experiences significant bald eagle use. Table 5-3 on page 125 presents basin-wide yearly totals for young and territories for Lake Cascade, the North Fork Payette River, and Deadwood Reservoir. The subsections below describe bald eagle use in the river reaches and reservoirs in greater detail.

**Lake Cascade and North Fork Payette River**

Since the first discovery of the Donnelly nest site in 1976, Lake Cascade on the North Fork Payette River has become recognized as an important area for nesting bald eagles in Idaho. Lake Cascade is located within PBERP's Zone 15. The objective for Zone 15 is to have at least four breeding pairs producing 1.0 fledgling per occupied site. As Table 5-3 on page 125 illustrates, Lake Cascade has nine active breeding territories. Home ranges of the nine bald eagle breeding pairs encompass almost the entire reservoir with foraging concentrated in the shallow areas along the shoreline and in the upper tributary arms (Kimball and Bechard 2002). The North Fork Payette River has three territories below Cascade Dam, two of which were new in 2000, and two territories between Lake Cascade and Payette Lake.

Nesting birds at Lake Cascade usually arrive in late winter and lay eggs in March. Eggs hatch from mid-April to early May (USFWS et al. 1990). Parents and young eaglets remain in the nest area until early September. Some records indicate that bald eagles are absent during winter because most of the lake ices over; however, a few eagles are sometimes found around open water on the east side near the Hot Springs Creek inlet. Wintering birds may also be found along the North Fork Payette River, primarily in the Cabarton reach.

Bald eagles primarily prey on fish at Lake Cascade and North Fork Payette River. Lake Cascade was formerly one of the most productive fisheries in Idaho, annually yielding about 600,000 gamefish, mainly yellow perch and rainbow trout. Since the mid-1990s, predacious pikeminnow and competition with nongame fish such as suckers caused the perch fishery to collapse (however, fish are still abundant in the lake). Eagles also rely on dead fish found along the shoreline during late winter and late summer die-offs (USFWS et al. 1990). The lake attracts large flocks of water birds that also provide potential prey sources, especially during early spring and fall migrations.

Poor lake water quality poses a threat to the health of the fishery and the bald eagle prey base. High nutrient levels (mostly phosphorus) have caused algae blooms and fish kills from oxygen depletion. Bacterial pollution is also a concern. Nutrients and bacteria originate from agriculture, forest practices, urban wastewater and stormwater, and recreational use. Water quality improvement programs have recently reduced phosphorus input to the lake.

In 1990, the USFWS, Reclamation, and the USFS jointly prepared the Cascade Reservoir Bald Eagle Management Plan (USFWS et al. 1990). The purpose of the plan is to give Reclamation and the USFS site-specific management direction for the bald eagle breeding territories. Reclamation incorporated these management strategies in its 1991 Cascade Reservoir Resource Management Plan and the update

of the plan in 2002 (USBR 2002). Both plans concentrate on Lake Cascade land management activities to maintain and improve bald eagle productivity. Based in part on consultation with USFWS under Section 7 of the ESA, Reclamation designated wildlife management areas and conservation/open space areas to protect nest sites and important foraging areas from human activity.

In 1995, Reclamation issued an EA/FONSI for the management of uncontracted storage space in Lake Cascade and Deadwood Reservoir (USBR 1995b). Reclamation's recommended plan for the long-term management of uncontracted storage in these reservoirs was to retain the storage in Reclamation ownership to maintain a 294,000-acre-foot minimum pool in Lake Cascade to protect water quality, fisheries, wildlife (including bald eagles), and lake recreation. The remaining acre-feet of uncontracted Lake Cascade space, based on an annual evaluation by concerned agencies, will be designated for salmon flow augmentation.

Reclamation formally consulted with the USFWS under Section 7 of ESA for the management of the uncontracted space. In its biological opinion, the USFWS concluded that incidental take may result from the proposed action; however, as long as the effects of annual reservoir drawdown are subject to annual review, the level of impact is not likely to result in jeopardy to bald eagles. Reclamation has met annually with USFWS and others to coordinate reservoir operations in accordance with the consultation requirements.

In 2002, Reclamation cooperated with Boise State University to prepare updated nest site management plans for the Sugarloaf and Gold Fork territories and the newly discovered Island/Hot Spring territory (Kimball and Bechard 2002). These plans were updated due to the potential re-opening of the nearby State airstrip at Lake Cascade. Plans to consider re-opening the airstrip are currently being evaluated.

Some operational aspects of Payette Lake are coordinated with the operation of Lake Cascade. Specifically, Lake Reservoir Company is able to hold Payette Lake high throughout the summer because Reclamation can deliver Payette Lake irrigation storage from Lake Cascade. In the fall, Payette Lake is drafted and this extra water is held in Lake Cascade. This results in flows below Payette Lake that are essentially equal to inflow and relatively stable throughout the summer. In the fall, flows in the North Fork are increased, resulting in an abnormal hydrologic pattern.

It is unknown how this operation affects bald eagle prey species in the North Fork; however, this reach continues to support two relatively productive bald eagle breeding territories.

**Deadwood Reservoir**

Deadwood Reservoir is also in the PBERP Zone 15. It has a recovery target of one breeding territory, and it currently supports one breeding territory. This nest was first documented in 1996 (see Table 5-3 on page 125). The breeding bald eagle pair has produced at least one young every year since 1996 except for 2003 when the territory was unoccupied and an alternate nest was discovered. These birds probably forage on the plentiful kokanee, whitefish, and trout in the reservoir and on waterfowl.

Because it has a high elevation, Deadwood Reservoir ices over early and is not suitable as winter bald eagle habitat.

**South Fork and Mainstem Payette River**

The only recent breeding territory for this area is within the Montour Wildlife/ Recreation Management Area. This nest has not been occupied for many years and is now considered a historical nest. The PBERP goal for the Garden Valley/Lowman area of Zone 15, which includes this river reach, does not include target breeding territories and lists the wintering population as 10 eagles.

The South Fork Payette River from Lowman to Banks, most of which lies downstream from the Deadwood River confluence, receives fairly heavy bald eagle use in the winter. Winter counts since 1987 have ranged from 2 to 16 eagles (Steenhoff 1997). Similar to the upper Boise River area, this reach is a critical big game winter range. Carrion is probably an important food source for bald eagles, especially in late winter. Bald eagles also are found along the mainstem Payette River with winter counts ranging from 4 to 20 eagles in the reach from Emmett to Payette.

## 5.7.7 Owyhee River System

The Owyhee River, including Lake Owyhee, is within the PBERP's Zone 16. The target is one breeding territory on the river for recovery; however, there currently are no known bald eagle breeding territories at Lake Owyhee or on the Owyhee River (Isaacs and Anthony 2003).

Larson (1993) indicated that between 20 and 30 bald eagles are found wintering at the reservoir and on the lower river, and bald eagles migrate through the area in spring and fall. The ODFW (1997) conducted one-day vehicle surveys during January from 1994 to 1997; these surveys revealed zero to one bald eagle along the river downstream from the dam and near Owyhee State Park. The low number of bald eagles during these one day surveys may be due to the variability in numbers of

wintering bald eagles from year to year and within a given year depending on weather, local prey availability and other factors.

While low winter releases appear to sustain rainbow trout, brown trout, nongame fish, and waterfowl, Larsen (1993) considers low winter flows the greatest limiting factor for fish in the Owyhee River. Low flows in the river concentrate potential prey such as fish and waterfowl in deeper pools, although these pools often freeze over. Wintering eagles are particularly attracted to the ice-free water, available perches, and an abundance of waterfowl at the Snively Hot Springs on the Owyhee River. The ODFW stocks the river with rainbow trout fingerlings in the spring. Some of these fish do survive through the summer, which probably augments the number of fish available to wintering eagles. Owyhee Reservoir is also an important resting area for migrating waterfowl (Larson 1993).

The lower end of the river supports warmwater fish, which are also limited by low flows between irrigation seasons. However, the reservoir or parts of the reservoir remain ice-free in most years and available for foraging. Mammal carrion is also available in the general area of the reservoir.

Storage for irrigation and operations for flood control probably has caused some negative effects on cottonwood regeneration downstream from the dam. However, in some years, over 2,000 cfs have been released for flood control, and this has allowed some regeneration to occur. Currently, there appears to be adequate large perching trees and cliffs for eagle use in the upper river reaches.

Water quality problems at Lake Owyhee include high levels of suspended particulates, nutrient-caused algae blooms, and elevated concentrations of mercury in sediment, water, and fish tissue (Larson 1993; Craft et al. 2000). Mercury in fish is a concern for piscivorous birds like bald eagles since it can bioaccumulate and biomagnify in tissues of these species. The sources of the mercury in Owyhee Reservoir appear to be from mining in the Jordan Creek watershed and local runoff from areas near the reservoir with naturally high mercury content. Suspended particulates appear to be the primary external loading vector (Craft et al. 2000).

The degree to which wintering bald eagles rely on fish living in Owyhee Reservoir and whether they have been affected by mercury bioaccumulation to the degree that reproduction is affected is unknown. There is no specific information available regarding the diet of bald eagles at and below Lake Owyhee. In some areas, wintering bald eagles have been shown to rely on waterfowl and mammalian carrion to a greater degree than fish during the winter when this alternate prey is available (Taylor and Bechard 1991). Larson (1993) notes that bald eagles are attracted to ice-free areas of the Owyhee River below the dam where waterfowl is abundant. Significant numbers of migrating waterfowl are available at the reservoir during

spring and fall. There are also areas of Owyhee Reservoir that are used as winter range by mule deer (Larson 1993), and winter-kill carrion is probably available to bald eagles in these areas. The availability of prey other than fish at the reservoir, and the fact that wintering birds are only present for a few months of the year, would tend to limit the amount of mercury intake.

### 5.7.8 Mann Creek Reservoir

Bald eagles do not nest at Mann Creek Reservoir. Some winter use likely occurs at the reservoir and along the Weiser River below the confluence with Mann Creek; however, this area is not part of the annual mid-winter survey. The lack of suitable perches at the reservoir and the small size of Mann Creek likely limit bald eagle use.

### 5.7.9 Malheur River System

There are no known bald eagle breeding territories within the Malheur River system. The PBERP target for the Malheur River basin area is one breeding territory each at Beulah and Bully Creek Reservoirs. Nest sites at these reservoirs may be somewhat limited since there are no large conifers and few large open-story cottonwood trees.

Bald eagles are present in the winter at Beulah and Bully Creek Reservoirs and along the Malheur River downstream. Mid-winter one-day ODFW surveys (1997) from 1988 to 1997 found between 1 and 11 bald eagles along the Malheur River between Beulah Reservoir and Vale, Oregon. Winter counts at Bully Creek Reservoir from 1994 to 1997 ranged from zero to two eagles. No winter count information is available for Warm Springs Reservoir. Although some winter use may occur, the lack of perches and roosts may limit the winter suitability of Warm Springs Reservoir.

### 5.7.10 Powder and Burnt River Systems

PBERP goals for this area are five breeding territories, one each for Phillips Lake, Unity and Thief Valley Reservoirs, and the Powder and Burnt Rivers.

Bald eagles nest at both Phillips Lake on the Powder River and Unity Reservoir on the Burnt River (Isaacs and Anthony 2003). The breeding territory at Phillips Reservoir has been occupied since 1989 and has been very productive, fledging one or two young each year since 1990. The territory at Unity Reservoir was first known to be active in 1984 and had been occupied most years. This territory was very productive at its original nest site, even through very dry years in the late 1980s and early 1990s (Isaacs and Anthony 2003). Since the nest was relocated to its present site in 1995, it has been successful only in 1998 and 1999.

Isaacs et al. (1992) studied wintering bald eagles in northeast Oregon, including the Powder and Burnt River systems. Winter counts and estimates from 1988 to 1990 in Baker County, which included bald eagles using the Powder and Burnt Rivers as well as adjacent agricultural areas, ranged from 0 to 15 eagles with the highest average count of 12 eagles occurring in early March. In January and early February, bald eagles were most common along the rivers and reservoirs. In late February and March, bald eagles were most common in agricultural areas such as Baker Valley, downstream from the town of Baker City, and Keating Valley, downstream from Thief Valley Reservoir. This shift in use is likely related to changes in food abundance, food availability, and age structure of the wintering eagle population. Counts at Phillips Lake and Unity Reservoir ranged from zero to four eagles.

# 5.8 Effects Analysis

The area of analysis for bald eagles includes the action areas for all 11 proposed actions. The following subsections identify river reaches and reservoirs where the proposed actions may have a hydrologic influence. Section 5.9 summarizes Reclamation's determination for each proposed action.

## 5.8.1 Snake River System above Milner Dam

Bald eagles in these river reaches and reservoirs are in the action area for future O&M in the Snake River system above Milner Dam.

**Snake River in Wyoming**

Under the proposed action, the Jackson Lake water surface elevation will continue to fluctuate. However, as under current conditions, these operational effects appear to have a completely benign effect on the bald eagle. Reclamation will continue to release water to benefit the downstream fishery during winter months. This includes increasing releases when winter inflow to the reservoir drops below 280 cfs (if the WDGF requests release of their contracted storage water) and an informal commitment not to release more than 600 cfs to prevent the formation of frazzle ice, which can adversely affect the fishery.

The Snake River below Jackson Dam will continue to support sufficient habitat for fish and waterfowl prey during the eagle breeding season, and the year-long resident bald eagles will continue to have an abundant prey base.

**Snake River and Tributaries from the Wyoming State Line to the Henrys Fork Confluence**

*Palisades Reservoir*

Under the proposed action, Reclamation will continue to draw down Palisades Reservoir. There are no definitive trend data available that show that either reservoir drawdowns or winter operations that will occur under the proposed action will affect breeding or wintering bald eagles in this area. As described in Section 5.7.1, the anecdotal data about low reservoir levels reducing overall productivity at Palisades Reservoir (Whitfield 2002) are juxtaposed with the report that at Palisades Reservoir, only the Hoffman nest was not occupied and that 4 of the 7 nests were successful even though the reservoir was drawn down to its lowest elevations in several years (Sallabanks 2003b); in 2004, 6 of the 7 nests were active (Alfred 2004; see also Table 5-2 on page 117).

The fishery and waterfowl populations will remain an adequate food source for wintering bald eagles, and carrion will also be available on adjacent lands when the reservoir freezes over (between December and March). A fish kill has not occurred at Palisades Reservoir since construction in 1956, probably due to the relatively lower summer air temperatures and fact that several live streams enter the lower end of the reservoir and maintain water quality, mainly dissolved oxygen. Additionally, the reservoir is 125 feet deep at the bottom of the conservation pool and 80 feet deep at the top of the dead pool. Use of powerhead space to make up a shortfall in flow augmentation will not cause water quality or quantity conditions to cause a fish kill that would adversely affect nesting bald eagles.

*Snake River below Palisades Dam*

The proposed action will influence the hydrology of the Snake River below Palisades Dam. Low winter flows, like those minimum flows described in the historical record at the Snake River near Irwin gage (see Appendix C), will occur in the mainstem Snake River and will reduce the river's wetted perimeter by drying up the side channels. This will force fish overwintering in these channels to move into the mainstem. However, this is not likely to limit the eagles' foraging opportunities. As under current conditions, the eagles will still have foraging access to a large fishery in the main channel and to big game carrion in adjacent areas.

High spring flows occasionally inundate waterfowl nesting habitat, but this probably does not have a measurable impact on the presence or overall production of waterfowl. Waterfowl appear to be abundant along this reach of the Snake River throughout the year in most years. There is no available information to indicate that a

reduction in water fowl breeding success has an effect on breeding bald eagles ability to find sufficient forage.

Flood control operations at Palisades Reservoir have been reported to cause an adverse effect on the long-term maintenance and replacement of riparian habitat generally and cottonwood trees specifically (Moseley 2000; Murphy 2004; Hauer et al. 2004). In the long term, this type of reduction would limit the availability of perching, roosting, and nesting sites along the floodplain. Under the proposed action, operations at Palisades Dam will not alter the current flood frequency, and flooding (24,500 cfs or greater) will continue to occur at a rate of about one year in seven. Additionally, Reclamation will be unable to prevent events similar to the 1997 flood.

Less severe flooding may occur in the proposed action when Reclamation provides spring freshets to mimic natural flow conditions. These flow magnitudes will likely provide the flooding and sediment mobilization necessary to continue the building of new alluvial seed beds and the germination of new trees (Hauer et al. 2004). It should be noted that flows above flood stage are not needed every year to maintain or even create riparian habitat. Hauer et al. (2004) indicate that flows between 19,000 and 25,000 cfs occur in 17 out of 45 years and provide sufficient energy to cause erosion and avulsion and maintain the shifting habitat mosaic. Cottonwoods pre-dating the construction of Palisades Dam and currently used for perching, roosting, and nesting may be lost due to age (Merigliano 1995), but flows in the proposed action will help retain or slow the loss of the riparian habitat and cottonwood stands. Merigliano (1995) estimated cottonwood recruitment (or lack thereof) and reported that in 40 years, the overall area of cottonwood habitat below Palisades will be reduced by 21 percent, and the majority of trees will be between 50 and 200 years old; however, this analysis was done prior to the 1997 flood. Based on the current condition of the existing riparian habitat, recent major flood events, and newly established cottonwood stands (Rice 2004; Williamson et al. 1998), a significant reduction in available perching, roosting, and nesting in the next 30 years is not likely to occur.

**Henrys Fork and Tributaries**

Effects of the proposed action on the Henrys Fork drainage will be similar to effects on the mainstem Snake River. An abundant waterfowl and fishery resource will continue to provide a good forage base for the more than 20 bald eagle breeding territories in this area. Similar to other fluctuating reservoirs in eastern Idaho and western Wyoming, reservoir drawdowns appear to have an immeasurable and likely insignificant effect on bald eagles because of the abundance of other prey in the occupied territories (see Table 5-2 on page 120).

Under the proposed action, flow regulations downstream from Island Park Reservoir may insignificantly affect the long-term availability of rainbow trout for bald eagles.

The potential for winter flows to drop below 200 cfs (and subsequently dewater juvenile fish habitat) slightly decreases under the proposed action (from 33 percent to 31 percent). Flows at 200 cfs or greater provides a significant increase in winter habitat for juvenile rainbows (Benjamin and Van Kirk 1999). This could provide bald eagles with an unquantified beneficial effect on future availability of forage fish. Under the proposed action, the Henrys Fork will continue to maintain a quality trout fishery and the two-percent difference in maintaining the 200-cfs winter flow will have an insignificant effect. The fishery will not be reduced by the proposed action such that it is limited as a food source for bald eagles.

**Snake River and Tributaries from the Henrys Fork to Milner Dam**

The Ririe Reservoir on Willow Creek and the Snake River from the Henrys Fork to Milner Dam, American Falls Reservoir, and Lake Walcott will continue to support an abundance of waterfowl and fish. The nesting eagles within this area also benefit from this abundant forage base. The proposed action is unlikely to adversely affect the food base for bald eagles in this reach.

The numbers of wintering bald eagles in this area have maintained or increased since 1980. Flood control operations have a greater effect on limiting the replacement of the cottonwood forest in the reach. Spring freshets released from Palisades Dam will have a beneficial but limited effect on reshaping the riparian habitat in this considerably larger reach of the Snake River. Releases from Palisades Reservoir have no effect on Ririe Reservoir or Willow Creek. As in the Snake River below Palisades Dam, nesting and perching trees will remain available for at least the next 30 years.

## 5.8.2 Snake River from Milner Dam to Brownlee Reservoir

Bald eagles in this reach occur in at least part of the action areas for all 11 proposed actions. This effects discussion considers the combined effects of these 11 actions.

This reach of the Snake River supports an abundance of waterfowl and fish. Reclamation's releases for salmon flow augmentation will continue to increase flows in this reach during the summer; this will help maintain and improve habitats for fish and waterfowl, and it will continue to supply an adequate food base for wintering eagles along the river and the nesting territory near Brownlee Reservoir. This beneficial effect will be especially evident in the reach immediately below Milner Dam.

### 5.8.3 Snake River from Brownlee Reservoir to the Columbia River and the Columbia River to its Mouth

Bald eagles in this reach occur in at least part of the action areas for all 11 proposed actions. This effects discussion considers the combined effects of these 11 actions.

The model predicts that the combined effects of the proposed actions will decrease winter inflows to Brownlee Reservoir but increase spring and summer inflows. This combined effect would be no more than a 448-cfs decrease in average monthly inflow in the winter and early spring from current operations. During the driest years Brownlee Reservoir inflows could increase by as much as 1,100 cfs in July (at the 90-percent exceedance) compared to current operations.

These hydrologic increases and decreases will not likely have any measurable effect on the bald eagle prey base in the Hells Canyon Complex and areas downstream. The changes to Brownlee Reservoir inflows are relatively minor when compared to existing inflows, and Brownlee Reservoir elevations are not likely to be affected at all since flow augmentation is assumed to be passed through the three reservoirs. The 11 proposed actions will have no effect on the levels of DDT/DDE in fish at Brownlee Reservoir or the exposure to these chemicals by breeding and wintering bald eagles. Changes in flows below Hells Canyon Dam are also be unlikely to have a measurable effect on resident fish habitat and prey abundance and availability for bald eagles since changes would be very minor compared to existing flows.

### 5.8.4 Little Wood River System

Little Wood River Reservoir is in the action area for future operations in the Little Wood River system. However, this proposed action will have no effect on the species because the species is not known to occur in this area.

### 5.8.5 Boise River System

Bald eagles in these river reaches and reservoirs are in the action area for future O&M in the Boise River system.

**Upper Boise River and Anderson Ranch, Arrowrock, and Lucky Peak Reservoirs**

*Anderson Ranch, Arrowrock, and Lucky Peak Reservoirs*

The number of bald eagle breeding territories in the Boise River system has continued to increase since 1995 (see Table 5-3 on page 125), which reflects both the range-wide recovery of the species and the benefits of an abundant prey base at Anderson Ranch and Arrowrock Reservoirs and downstream river reaches. As described in Section 5.7.5, there appears to be no correlation with yearly variations in operation in

the past (dry/wet years) that would indicate prey availability is significantly affected and is limiting bald eagle productivity.

The model predicts that the Anderson Ranch reservoir pool will never fall below 43,000 acre-feet, and the winter (October to March) minimum pool will be at least 106,000 acre-feet in 95 percent of the years. At Arrowrock Reservoir, the model predicts that end-of-month reservoir contents in September, typically the month of lowest reservoir elevation, will be at least 28,000 acre-feet in all years, and will be at least 40,000 acre-feet in 95 percent of the years. Lucky Peak Reservoir would have an average pool in October, the lowest month, of at least 67,000 acre-feet in 95 percent of the years modeled and will never drop below its 29,000-acre-foot inactive capacity. Conditions related to maintenance of Lucky Peak Dam and the powerplant are not incorporated into the model, are not part of the proposed actions, and are outside of the scope of this consultation.

These minimum pool levels will continue to support an adequate fish and waterfowl prey base and benefit both breeding and wintering bald eagles. Reservoir levels below administratively established conservation pools or inactive/dead storage capacities are extremely unlikely to occur over the 30 years. Lower drawdowns in the Boise River reservoirs during drought periods will continue to temporarily benefit wintering eagle foraging by making fish more concentrated and vulnerable to capture; however, the predation levels are not expected to appreciably reduce the numbers of fish available to breeding eagles in spring and summer. Based on past operations, the low pools described above will continue to support sufficient fish for bald eagles in years following deep drawdowns.

Fish kills can occur due to anoxic conditions; however, these have been limited to a single species (kokanee) in Anderson Ranch Reservoir and likely do not significantly reduce the total numbers of fish in the reservoir.

*South Fork Boise River*

Releases from Anderson Ranch Dam to provide minimum flows in the South Fork Boise River of at least 300 cfs in the fall and winter and at least 600 cfs during the remainder of the year meet the current recommendations for protection and enhancement of resident fish. The model predicts releases of at least 293 cfs in 95 percent of all years with releases never dropping below 114 cfs. While this flow regime may be optimal for some fish species, it will occur infrequently and will continue to maintain sufficient fish prey, which, in addition to carrion, will continue to support breeding and wintering bald eagles in the South Fork Boise River.

Flood control operations at Anderson Ranch Reservoir may have some long-term effect on the regeneration of black cottonwood trees used by bald eagles for perching

along the South Fork Boise River. Although mature trees are currently available, the reduction in seasonal flooding also reduces the building of new alluvial seed beds and germination of new trees. The magnitude of the loss of mature cottonwoods over 30 years is undetermined. Flood control releases will still occur in wet years; the model predicts June monthly average flows of at least 3,000 cfs, which is roughly double normal summer releases, in 15 percent of the years modeled. This may provide some cottonwood regeneration. The overall effect to bald eagles will likely be insignificant because conifers and rock outcrops are also present in much of this reach.

**Lower Boise River**

The Boise River downstream from Lucky Peak Dam will be operated to deliver irrigation and salmon flow augmentation water, provide flood control, and release between 150 and 240 cfs during the non-irrigation season in most years. The model predicts winter flows measured at Glenwood Bridge of at least 240 cfs in 50 percent of the years modeled, and at least 150 cfs in 83 percent of the years modeled. During successive dry years, when storage allocated to streamflows does not fill, flows may be as low as 80 cfs. This flow regime is not optimal; however, based on past operations, this reach will continue to have adequate prey to support wintering bald eagles.

Flood control operations will limit important side channel habitat for coldwater fish, which bald eagles take as prey (USFWS 1996). Lower overall river flows from irrigation diversions will continue to limit fish habitat (Riggin and Hansen 1992).

Even with the alteration of flows from Reclamation's reservoir operations, coldwater gamefish species such as mountain whitefish, hatchery rainbow trout, wild rainbow trout, and brown trout as well as nongame species are found in the river reach from Lucky Peak Dam to Star. These fish resources, waterfowl, and mammalian prey have sustained a significant number of wintering bald eagles and are expected to continue to do so.

The black cottonwood community along the lower river is an important habitat component for wintering bald eagles. An example of this is the communal night roost in cottonwood trees near Barber Pool. Flood control operations will continue to limit long-term cottonwood regeneration to some degree.

The model predicts flows of at least 6,500 cfs at Glenwood Bridge to occur 12 percent of the time in April and May; this will likely result in some cottonwood regeneration as flows recede, especially in areas where the river floodplain is broad, such as Barber Pool. This has occurred during other high flow periods in the late 1990s. The exact magnitude of the loss of mature cottonwoods over 30 years is

undetermined, but large trees are likely to persist along the river over the period, and impacts to wintering bald eagles are likely to be insignificant.

Effects on bald eagles in the river reach below Eagle Island are difficult to predict since there is a general lack of information on eagle use in this reach. Although several agencies and groups are addressing the reach's water quality problem, there is not likely to be a major change that will significantly alter the prey base for bald eagles over the next several years.

**Lake Lowell**

Lake Lowell will continue to support both breeding and wintering bald eagles that are attracted to fish, abundant waterfowl, and large cottonwood trees that ring much of the lake. Waterfowl and most fish populations will not be significantly affected. A series of normal to high water years may allow an improved sport fishery and potentially increase the bald eagle prey base.

Operations that affect gamefish populations, especially during drought, will continue. However, Taylor and Bechard (1991) concluded that bald eagles are not adversely affected by the lack of gamefish since they frequently take waterfowl and nongame fish such as carp. These food sources will continue to persist, even in dry years when the lake is lowered considerably. The model predicts that average September lake contents will be at least 10,000 acre-feet in 96 percent of years modeled, and at least 2,500 acre-feet in all years.

There may be a potential for fish kills for some species due to nutrient-related water quality problems; however, the abundance of nongame species such as carp that are tolerant of poor water quality should continue to provide an abundant prey base that benefits both breeding and wintering bald eagles.

It is unknown whether DDT and mercury are having an effect on bald eagle productivity. Burch and King (2000) did not detect either mercury or DDT-related chemicals in drains and canals that flow into the lake. Reclamation's future operations are not expected to exacerbate the contaminant levels in fish and lake sediment.

### 5.8.6 Payette River System

Bald eagles in these river reaches and reservoirs are in the action area for future O&M in the Payette River system.

**North Fork Payette River and Lake Cascade**

*North Fork Payette River below Payette Lake*

Continued operations at Payette Lake, which passes inflow in the summer and increased flows below in the fall as the lake is drafted to its natural elevation, will be similar to past operation. This operation should continue to provide adequate prey benefiting the two productive breeding territories and any wintering birds.

*Lake Cascade*

The number of breeding bald eagle territories continues to increase at Lake Cascade and the North Fork Payette River, with four new territories added since 1998. In 1995, Reclamation committed to maintaining a 300,000-acre-foot conservation pool at Lake Cascade while using 70,000 acre-feet of uncontracted storage for salmon flow augmentation (USBR 1995b). Productivity has been fairly steady as the number of territories has increased (see Table 5-3 on page 125). This is an indication that prey has been adequate under a variety of operating scenarios.

The model predicts a minimum pool of about 300,000 acre-feet through the winter for 93 percent of the years modeled. During certain severely dry years (expected to occur about 7 percent of the time), up to 30,000 acre-feet of water from Reclamation's uncontracted storage in the Payette River system may be available for rental to irrigators in the Boise Project. Generally, uncontracted storage in Deadwood Reservoir can provide some of this water, and the conservation pool at Lake Cascade will not be affected. However, in some rare instances, Reclamation could deliver as much as 7,000 acre-feet from uncontracted space in the conservation pool. The model predicts that the minimum pool will always be at least 290,000 acre-feet.

The minimum pool and other actions to improve water quality in Lake Cascade under the State of Idaho's TMDL process should ensure an adequate prey base to benefit breeding bald eagles. A small, infrequent reduction in the minimum pool during severely dry years is not likely to have a noticeable effect on prey species. Bald eagle production is expected to be similar to current conditions, which exceed Recovery Plan goals.

*North Fork Payette River below Lake Cascade*

The continued maintenance of a 200-cfs winter minimum flow from Cascade Dam should provide ample prey for the existing three breeding territories; this flow may also support new territories. Bald eagles will continue to benefit from these operations.

**Deadwood Reservoir**

The model predicts that in nearly all water years, Reclamation will continue to provide irrigation and flow augmentation water while still maintaining a 50,000-acre-foot minimum pool at Deadwood Reservoir. During certain severely dry years (expected to occur about 7 percent of the time), up to 30,000 acre-feet of water from Reclamation's uncontracted storage in the Payette River system may be available for rental to irrigators in the Boise Project. Generally, uncontracted storage in Deadwood Reservoir can provide some of this water, and the conservation pool will not be affected. However, in some rare instances, Reclamation could deliver as much as 6,000 acre-feet from uncontracted space in the conservation pool (the model predicts this may occur in up to 5 percent of water years modeled). The model predicts that the minimum pool will always be at least 44,000 acre-feet.

The maintenance of the 50,000-acre-foot pool meets Riggin and Hansen's (1992) minimum recommendations for protection of fish spawning and rearing habitat. Drafting below 50,000 acre-feet will occur only rarely and will not likely reduce the reservoir fish resource to the extent that fish populations or bald eagle foraging and productivity will be adversely affected. Bald eagles will continue to benefit from the abundant fish in the reservoir.

**South Fork and Mainstem Payette River**

Reclamation's continued operation of Cascade and Deadwood Dams and natural flows in the South Fork and tributaries will provide a flow regime similar to the past several years. These operations are unlikely to change fish populations, and there should be ample fish prey as well as big game carrion to support wintering bald eagles. The winter flow regime in the mainstem Payette River below Emmett will also be similar to the past, and adequate fish prey for wintering eagles will also be available in this reach.

## 5.8.7 Owyhee River System

Bald eagles in these river reaches and reservoir are in the action area for future O&M in the Owyhee River system.

With its abundant fishery resource, Lake Owyhee and the Owyhee River will continue to support wintering eagles. Conditions on the reservoir are not expected to change, and there is ample winter carryover to maintain the aquatic ecosystem and fish prey base. The 30-cfs minimum flow from Owyhee Dam during the non-irrigation season (except during times of irrigation shortage when flows would be reduced proportional to the shortage) is an improvement over the past operations when winter releases ranged from 15 to 20 cfs in good water years to 2 to 4 cfs from

leakage through the dam during dry years. This increase in winter flows will benefit the fishery in the upper reaches of the river and increase the prey base for wintering bald eagles. It may also keep the river pools ice-free longer, which would also benefit eagle foraging.

Future operations at Owyhee Reservoir are not expected to exacerbate mercury contamination in bald eagles. Because bald eagles spend only a portion of the year at the reservoir and have other prey items available during the winter, their exposure to mercury is lessened. It is doubtful that future operations will expose bald eagles to mercury contamination to the point that adverse effects occur.

The lower end of the river will continue to support warmwater fish and will likely also benefit from increased winter releases. The lower reaches remain ice-free in most years and are available for foraging. Mammal carrion will also continue to be available in the general area of the reservoir.

Storage for irrigation and operations for flood control will limit cottonwood regeneration downstream from the dam. However, occasional storage releases for flood control over 2,000 cfs will continue to allow some regeneration to occur. The adequate large perching trees and cliffs in the upper river reaches will remain, and there are some smaller trees that will be available as they mature over the next 30 years.

### 5.8.8 Mann Creek System

Bald eagles at this reservoir are in the action area for future O&M in the Mann Creek system.

Winter use of Mann Creek Reservoir is poorly documented but probably limited due to lack of perches, low winter pool, and ice cover. Although deep drafts of the reservoir likely reduce the number of fish during drought years, some fish, especially nongame species, will continue to persist. Their persistence will continue to provide foraging opportunities to small numbers of wintering bald eagles at the reservoir until it ices over.

### 5.8.9 Malheur River System

Bald eagles in these river reaches and reservoirs are in the action area for future O&M in the Malheur River system.

Warm Springs, Beulah, and Bully Creek Reservoirs will continue to be operated solely for irrigation and flood control with no minimum streamflow requirements below the dams. Relatively few wintering bald eagles have been found in areas

surveyed at and downstream from Reclamation facilities in the basin; this is likely due to a lack of suitable perch trees in many areas.

Fish are available in the reservoirs until they ice over. During very dry years when the reservoirs may be completely drained, wintering eagles probably would shift their foraging to river areas downstream where entrained fish are plentiful. Winter streamflows may limit the distribution of wintering eagles to reaches where there are pools or other areas where fish tend to be concentrated; however, bald eagle prey in the form of fish, waterfowl, and big game carrion is generally available. Downstream from Warm Springs Reservoir, the South Fork Malheur River contributes substantially to streamflow in the winter and improves habitat in the mainstem Malheur River for fish and waterfowl prey for bald eagles that may winter in this reach.

While the continued operation of the three reservoirs for irrigation and flood control is not optimal for bald eagles, this operation continues to provide benefits to a limited number of wintering bald eagles.

### 5.8.10 Powder and Burnt River Systems

Bald eagles in Phillips Lake and the Powder River upstream from Thief Valley Reservoir are in the action area for future O&M in the upper Powder River system. Bald eagles in Thief Valley Reservoir and the downstream Powder River are in the action areas for future O&M in both the upper and lower Powder River systems. In Thief Valley Reservoir and the downstream Powder River, the effects discussion considers the combined effects of the two proposed actions. Unity Reservoir and the Burnt River are in the action area for future O&M in the Burnt River system.

The presence of a successful breeding pair of eagles at Phillips Lake is an indication that Reclamation's past operations have maintained suitable populations of prey (fish and waterfowl) to sustain these birds and their offspring. The bald eagle pair is expected to continue to benefit from this operation and maintain a productive breeding territory.

Reclamation will continue to operate Phillips Lake and Thief Valley and Unity Reservoirs as in the past. All three reservoirs will be drawn down significantly for irrigation, especially in dry years; and winter flows below the dams will not be optimal for fish and waterfowl preyed upon by bald eagles. However, even during dry years, the reservoirs and rivers below will likely still benefit breeding bald eagles at Phillips Lake and Unity Reservoir by providing ample fish prey.

Although the productivity of the breeding territory at Unity Reservoir has been sporadic, it may be due to other factors, such as a less-than-suitable nest site.

Production has fallen off since a new nest site was chosen in 1995. There does not seem to be any correlation between drought and breeding success for this territory since there were productive years during very dry periods and low reservoir levels, and there have been unproductive years during and after relatively good water years.

Isaacs et al. (1992) found moderate numbers of bald eagles wintering throughout the Burnt and Powder River valleys, including near Unity Reservoir and Phillips Lake from 1988 to 1991, a period of prolonged drought. These birds relied on a variety of prey, especially in the Baker Valley where they were observed foraging in agricultural areas for mammalian prey in late winter and spring. The bald eagle prey base in the Burnt and Powder River systems will continue to be maintained similar to current levels.

### 5.8.11 Cumulative Effects

Within the action areas, the cumulative effect of urban sprawl, industrial and housing developments, and human disturbance from recreation will likely continue to threaten bald eagles. This is especially true near Boise and Eagle. The black cottonwood community along the lower Boise River is a critical habitat component for wintering bald eagles. In addition to Reclamation's and the Army Corps of Engineers' flood control operations, river channelization and adjacent land development through Boise will continue to limit long-term cottonwood regeneration. The magnitude of the loss of mature cottonwoods over the next 30 years is undetermined, but large trees are likely to persist along the river over this period.

Nesting eagles at Lake Cascade also face increasing amounts of recreational use and development of nearby lands, which will add to the human disturbance of some nesting sites and foraging areas. Although somewhat tolerant of human activity, disturbances may reach a point where productivity is affected or nests are abandoned.

The forage base for bald eagles at most reservoirs and many river reaches in the action areas will continue to be augmented through the stocking of gamefish by state fish and wildlife agencies.

## 5.9 Effects Conclusion

Reclamation has determined that future operations in the Little Wood River system will have no effect on breeding or wintering bald eagles.

Reclamation has also determined that future O&M in the Snake River system above Milner Dam, Boise River system, Payette River system, Owyhee River system, Mann Creek system, Malheur River system, upper and lower Powder River systems, Burnt

River system, and future provision of salmon flow augmentation from the rental or acquisition of natural flow rights may affect but are not likely to adversely affect breeding or wintering bald eagles in their respective action areas.

# 5.10 Literature Cited


| Parenthetical Reference | Bibliographic Citation |
|---|---|
| 60 FR 35999 | Federal Register. U.S. Fish and Wildlife Service Final Rule: Endangered and Threatened Wildlife and Plants; Final Rule to Reclassify the Bald Eagle from Endangered to Threatened in All of the Lower 48 States. July 12, 1995, Vol. 60, No. 133, pp. 35999-36010. |
| 64 FR 36453 | Federal Register. U.S. Fish and Wildlife Service Proposed Rule: Endangered and Threatened Wildlife and Plants; Proposed Rule to Remove the Bald Eagle in the Lower 48 States From the List of Endangered and Threatened Wildlife. July 6, 1999, Vol. 64, No. 128, pp. 36453-36464. |
| Alfred 2004 | Alfred, B. 2004. Biologist, Palisades Ranger District. U.S. Forest Service, Idaho Falls, Idaho. |
| Beals and Melquist 1995 | Beals J., and W. Melquist. 1995. *1995 Idaho Bald Eagle Nesting Report*. Idaho Department of Fish and Game, Boise, Idaho. |
| Beals and Melquist 1996 | Beals J., and W. Melquist. 1996. *1996 Idaho Bald Eagle Nesting Report*. Idaho Department of Fish and Game, Boise, Idaho. |
| Beals and Melquist 1997 | Beals J., and W. Melquist. 1997. *1997 Idaho Bald Eagle Nesting Report*. Idaho Department of Fish and Game, Boise, Idaho. |
| Beals and Melquist 1998 | Beals J., and W. Melquist. 1998. *1998 Idaho Bald Eagle Nesting Report*. Idaho Department of Fish and Game, Boise, Idaho. |
| Beals and Melquist 1999 | Beals J., and W. Melquist. 1999. *1999 Idaho Bald Eagle Nesting Report*. Idaho Department of Fish and Game, Boise, Idaho. |
| Beals and Melquist 2000 | Beals J., and W. Melquist. 2000. *2000 Idaho Bald Eagle Nesting Report*. Idaho Department of Fish and Game, Boise, Idaho. |
| Benjamin and Van Kirk 1999 | Benjamin, L., and R. Van Kirk. 1999. "Assessing Instream Flows and Reservoir Operations on an Eastern Idaho River." *Journal of the American Water Resources Association* Vol. 35, No. 4, August 1999. |

| Parenthetical Reference | Bibliographic Citation |
|---|---|
| Burch and King 2000 | Burch and King. 2000. *1998 Lake Lowell Water Quality Assessment, Deer Flat National Wildlife Refuge Planning Aid and Contaminants Study*. Snake River Basin Office, U.S. Fish and Wildlife Service, Boise, Idaho. |
| Clark and Maret 1998 | Clark, G., and T. Maret. 1998. *Organochlorine Compounds and Trace Elements in Fish Tissue and Bed Sediments in the Lower Snake River Basin, Idaho and Oregon*. Water-Resources Investigations report 98-4103. U.S. Geological Survey, Boise, Idaho. |
| Craft et al. 2000 | Craft, D., N. Cannon, D. Zimmer, K Krill, and L. DiMattia. 2000. *Water Quality and Mercury in Lake Owyhee, Southeastern Oregon*. Pacific Northwest Regional Office, Bureau of Reclamation, Boise, Idaho. |
| Davidson et al. 2004 | Davidson, A., Cichosz, T., A. Sondenaa, and D Saul. 2004. *Snake Hells Canyon Subbasin Assessment.* Northwest Power and Conservation Council, Portland, Oregon. |
| Dombrowsky et al. 2000 | Dombrowsky, F., C. Blair, and J. Dingledine. 2000. *Contaminant Evaluation for the Brownlee Reservoir, Snake River Basin, Idaho*. Technical Report E.3.2-22, Hells Canyon FERC License Application. Idaho Power Company, Boise, Idaho. |
| Fenzel 2004 | Fenzel, T. 2004. Assistant Manager, Deer Flat National Wildlife Refuge. Nampa, Idaho. |
| GYBEWG 1996 | Greater Yellowstone Bald Eagle Working Group. 1996. *Greater Yellowstone Bald Eagle Management Plan: 1995 Update.* Greater Yellowstone Bald Eagle Working Group, Wyoming Game and Fish Department, Lander, Wyoming. |
| Harmata and Oakleaf 1992 | Harmata, A.R., and B. Oakleaf. 1992. *Bald Eagles in the Greater Yellowstone Ecosystem: an Ecological Study with Emphasis on the Snake River, Wyoming.* Wyoming Game and Fish Department, Cheyenne, Wyoming. |
| Hauer et al. 2004 | Hauer, F.R., M.S. Lorang, D. Whited, and P. Matson. 2004. *Ecologically Based Systems Management: the Snake River - Palisades Dam to Henrys Fork.* Draft report for the Bureau of Reclamation, Boise, Idaho. Flathead Lake Biological Station, Division of Biological Sciences, University of Montana, Poloson, Montana. |
| Holthuijzen 2003 | Holthuijzen, A. 2003. *Distribution and Abundance of Wintering Bald Eagles in Hells Canyon.* Technical Report AppendixE.3.2-16. Hells Canyon FERC License Application. Idaho Power Company, Boise Idaho. |

| Parenthetical Reference | Bibliographic Citation |
|---|---|
| Idaho Power 2003 | Idaho Power Company. 2003. *New License Application, Hells Canyon FERC Project No. 1971, Executive Summary*. Boise, Idaho. |
| IDEQ 1996 | Idaho Division of Environmental Quality. 1996. *Cascade Reservoir Phase 1 Watershed Management Plan*. Southwest Regional Office, Boise, Idaho. |
| Isaacs et al. 1992 | Isaacs, F., S. Reed, R. Reed, and R. Anthony. 1992. *Habits of Bald Eagles Wintering in Northeastern Oregon and Adjacent Areas of Washington and Idaho*. Oregon Cooperative Wildlife Research Unit, Oregon State University, Corvallis, Oregon. |
| Isaacs and Anthony 2003 | Isaacs, F.B., and R.G. Anthony. 2003. *Bald Eagle Nest Locations and History of Use in Oregon and the Washington Portion of the Columbia Recovery Zone, 1971 through 2003*. Oregon Cooperative Fish and Wildlife Research Unit, Oregon State University, Corvallis, Oregon. |
| Kaltenecker and Bechard 1995 | Kaltenecker, G., and M. Bechard. 1995. *Bald Eagle Wintering Habitat Study, Upper Boise River Drainage, Idaho*. Raptor Research Series No. 9. Raptor Research Center, Department of Biology, Boise State University, Boise, Idaho. |
| Kimball and Bechard 2002 | Kimball, S., and M. Bechard. 2002. *Lake Cascade Bald Eagles: Nest Productivity, Home Range, Size, and Foraging Habitat Use*. Raptor Research Center, Boise State University, Boise, Idaho. |
| Larson 1993 | Larson, K. 1993. *Impacts on Fish and Wildlife Resources of the Proposed Owyhee Reservoir Resource Management Plan, Malheur County, Oregon*. Oregon State Office, U.S. Fish and Wildlife Service. |
| Megargle 2004 | Megargle, D. Fishery Manager, Idaho Department of Fish and Game. Magic Valley Region, Jerome, Idaho. Personal communication. |
| Merigliano 1995 | Merigliano, M. 1995. *Ecology and Management of the South Fork River Cottonwood Forest*. Final Draft Report. School of Forestry, University of Montana. |
| Moseley 2000 | Moseley, R.K. 2000. *Ute Ladies'-tresses (Spiranthes diluvialis) in Idaho: 1999 Status Report*. Natural Resource Policy Bureau, Idaho Department of Fish and Game, Boise, Idaho. |
| Murphy 2004 | Murphy, C. 2004. *Monitoring Ute Ladies'-tresses (Spiranthes diluvialis) on the South Fork Snake River, Idaho: Conservation Status and Third Year Results of Habitat Monitoring*. Idaho Conservation Data Center, Idaho Department of Fish and Game, Boise, Idaho. |

| Parenthetical Reference | Bibliographic Citation |
|---|---|
| National Biological Information Infrastructure 2004 | National Biological Information Infrastructure. 2004. *Midwinter Bald Eagle Count*. Website: ocid.nacse.org/cgi-bin/qml/nbii/eagles/routes.qml?qml_screen=Idaho. |
| ODFW 1997 | Oregon Department of Fish and Wildlife. 1997. *Midwinter Eagle Survey Results in Malheur County Oregon.* Ontario, Oregon. |
| Patla 2004 | Patla, S. 2004. Nongame Biologist, Jackson Office. Wyoming Game and Fish Department, Jackson, Wyoming. Personal communication. |
| Perkins and Kaltenecker 2003 | Perkins, D., and G. Kaltenecker. 2003. *Arrowrock Reservoir Bald Eagle Territory Management Plan, Boise River, Idaho*. |
| Perkins and Kaltenecker 2004 | Perkins D., and G. Kaltenecker. 2004. *Upper South Fork Arm Bald Eagle Territory Management Plan, Boise River, Idaho*. |
| Richter and Chandler 2001 | Richter, T., and J. Chandler. 2001. *1991-2000 Status of the Fish Community*. Technical Report Appendix E.3.1-5. Hells Canyon Resident Fish Study. Hells Canyon FERC License Application. Idaho Power Company, Boise, Idaho. |
| Rice 2004 | Rice, K. 2004. Ecologist, Idaho Falls Field Office. Bureau of Land Management, Idaho Falls, Idaho. Personal communication. |
| Riggins and Hansen 1992 | Riggins, S.H. and H.J. Hansen. 1992. *Phase 1 Water Rental Pilot Project: Snake River Resident Fish and Wildlife Resources and Management Recommendations.* Division of Fish and Wildlife, Bonneville Power Administration, U.S. Department of Energy, Portland, Oregon. |
| Ryan 1997 | Ryan, K. 1997. Refuge Manager, Deer Flat National Wildlife Refuge. U.S. Fish and Wildlife Department. Nampa, Idaho. Personal communication. |
| Sallabanks 2002 | Sallabanks, R. 2002. *2001 Idaho Bald Eagle Nesting Report*. Nongame and Endangered Wildlife Program, Idaho Department of Fish and Game, Boise, Idaho. |
| Sallabanks 2003a | Sallabanks, R. 2003a. *2002 Idaho Bald Eagle Nesting Report*. Nongame and Endangered Wildlife Program, Idaho Department of Fish and Game, Boise, Idaho. |
| Sallabanks 2003b | Sallabanks, R. 2003b. *Idaho Bald Eagle Nest Monitoring, 2003 Annual Report*. Nongame and Endangered Wildlife Program, Idaho Department of Fish and Game, Boise, Idaho. |

| Parenthetical Reference | Bibliographic Citation |
|---|---|
| Salow and Hostettler 2004 | Salow, T. and L. Hostettler. 2004. *Movement and Mortality Patterns of Adult Adfluvial Bull Trout (Salvelinus confluentus) in the Boise River Basin, Idaho*. Summary report submitted to the Arrowrock Bull Trout Advisory Group, Bureau of Reclamation, Snake River Area Office, Boise, Idaho. |
| Steenhoff 1997 | Steenhoff, K. 1997. *Results of 1997 Mid-Winter Bald Eagle Count.* Biological Resources Division, U.S. Geological Survey, Boise, Idaho. |
| Stinson et al. 2001 | Stinson, D., Watson J., and K. McAllister. 2001. *Washington State Status Report for the Bald Eagle.* Washington Department of Fish and Wildlife, Wildlife Program, Olympia, Washington. |
| Taylor and Bechard 1991 | Taylor, D., and M. Bechard. 1991. *Habitat Use by Bald Eagles During Dam Construction at Lake Lowell, Idaho*. Raptor Research Series No. 8. Raptor Research Center, Department of Biology, Boise State University, Boise, Idaho. |
| USBR 1995a | U.S. Bureau of Reclamation. 1995a. *American Falls Resource Management Plan*. Snake River Area Office, Pacific Northwest Region, Boise, Idaho. |
| USBR 1995b | U.S. Bureau of Reclamation. 1995b. *Finding of No Significant Impact and Final Environmental Assessment, Management of the Uncontracted Storage Space in Cascade and Deadwood Reservoirs*. Snake River Area Office, Pacific Northwest Region, Boise, Idaho. |
| USBR 1998 | U.S. Bureau of Reclamation. 1998. *Guidelines for Interpretation of the Biological effects of Selected Constituents in Biota, Water, and Sediment.* NIWQP, Denver, Colorado. |
| USBR 2001a | U.S. Bureau of Reclamation. 2001a. *Lake Lowell Water Quality Management Appraisal Study*. Pacific Northwest Region, Boise, Idaho |
| USBR 2001b | U.S. Bureau of Reclamation. 2001b. *Ririe Reservoir Resource Management Plan*. Snake River Area Office, Pacific Northwest Region, Boise, Idaho. |
| USBR 2002 | U.S. Bureau of Reclamation. 2002. *Lake Cascade Resource Management Plan*. Snake River Area Office, Pacific Northwest Region, Boise, Idaho. |
| USBR 2003 | U.S. Bureau of Reclamation. 2003a. *Biological Assessment on Continued Operation and Maintenance of the Deschutes River Basin projects and Effects on Essential Fish habitat under the Magnuson-Stevens Act*. Lower Columbia Area Office, Pacific Northwest Region, Portland, Oregon. |

| Parenthetical Reference | Bibliographic Citation |
|---|---|
| USBR 2004 | U.S. Bureau of Reclamation. 2004. *Black Canyon Reservoir and Montour Wildlife Management Area Resource Management Plan.* Snake River Area Office, Pacific Northwest Region, Boise, Idaho. |
| USFS et al. 1990 | U.S. Forest Service, U.S. Fish and Wildlife Service, and U.S. Bureau of Reclamation. 1990. *Cascade Reservoir Bald Eagle Management Plan*. Snake River Area Office, Pacific Northwest Region, Boise, Idaho. |
| USFWS 1986 | U.S. Fish and Wildlife Service. 1986. *Recovery Plan for the Pacific Bald Eagle*. Portland, Oregon. |
| USFWS et al. 1990 | U.S. Fish and Wildlife Service, U.S. Forest Service, and U.S. Bureau of Reclamation. 1990. *Cascade Bald Eagle Management Plan*. |
| USFWS 1994 | U.S. Fish and Wildlife Service. 1994. *Biological Opinion for Lake Roosevelt Bald Eagles--Salmon Flow Augmentation*. Idaho State Office, Boise, Idaho. |
| USFWS 1996 | U.S. Fish and Wildlife Service. 1996. *Draft Planning Aid Report, Water Contract Purchase for Salmon Flow Augmentation, Nampa-Meridian Irrigation District*. Snake River Basin Office, Boise, Idaho. |
| Whitfield 2002 | Whitfield, M.B., S. Miller, M. Wilson, J. Gardetto, K. Rice, B. Alford, L. Hanauska-Brown, and J. Naderman. 2002. *Annual Bald Eagle Productivity Final Report: Idaho Portion of the Greater Yellowstone Ecosystem Zone 18*. Idaho/GYE Bald Eagle Research Project. BLM, USFS, IDFG, and Northern Rockies Conservation Cooperative. |
| Whitfield et al. 2003 | Whitfield, M.B., S. Miller, M. Wilson, J. Gardetto, K. Rice, J. Rydalch, M. Zimmerman, B. Alford, L. Hanauska-Brown, and J. Naderman. 2003. *Annual Bald Eagle Productivity Final Report: Idaho Portion of the Greater Yellowstone Ecosystem Zone 18*. Idaho/GYE Bald Eagle Research Project. BLM, USFS, IDFG, and Northern Rockies Conservation Cooperative. |
| Williamson et al. 1998 | Williamson, M.C., M. Merigliano, P. Hansen, and H. Zuuring. 1998. *Post-1997 Floodplain Dynamics and Vegetation Establishment along the South Fork Snake River*. Annual Report. Montana Wetland and Riparian Research Program. School of Forestry, University of Montana. |